BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

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DISEASES DUE TO PROTOZOAN PARASITES.

AILLERIE. Enquête sur la mouche tsé-tsé et les trypanosomiases en Côte-d'Ivoire. [**An Enquiry into Tsetse Flies and the Trypanosomiasis of the Ivory Coast.**]—*Rec. Méd. Vét. Exot.* 1930. Jan.–Mar. Vol. 3. pp. 28–33.

The author points out that trypanosomiasis is one of the great obstacles to stock raising and to stock importation. He states that in the course of his tours in the colony, the three principal trypanosomes encountered are *T. dimorphon*, *T. cazalboui*, and *T. pecaudi*.

T. dimorphon is more common in the southern part of the colony than elsewhere. It affects ruminants mainly. Pigs, horses and dogs are less frequently infected.

T. cazalboui is common throughout the colony. It is very pathogenic for ruminants and particularly for imported zebus. It is frequently encountered in equidae.

T. pecaudi has an equally wide distribution, but occurs less frequently. It is particularly pathogenic for the horse, ass and dog. The trypanosome is invariably fatal to horses, and 90 per cent. of the transport donkeys are affected.

In the Lower Ivory Coast *G. palpalis* is of common occurrence. *G. morsitans* and *G. longipalpis* are less common, but they occur in the forest areas.

In the Middle Zone *G. longipalpis* is numerous, and *G. morsitans* and *G. palpalis*, although they occur, are less frequently encountered. In one particular area (Tagouanas) *G. tachinoides*, *G. palpalis*, *G. fusca*, and *G. longipalpis* occur.

The Upper Ivory Coast is an ideal cattle-raising country. *G. palpalis* and *G. longipalpis* are fairly numerous in practically all parts. Other species of tsetse have a more localized and limited distribution.

SCHWETZ (J.). Contribution à l'étude des trypanosomiases des suidés. [**The Trypanosomiases of the Suidae.**]—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 217–240. With 5 figs. on 2 plates.

In his introductory paragraphs the author points out that less is known regarding trypanosomiasis in pigs than in any other animal, and that existing information is in need of review.

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The striking features about porcine trypanosomiasis appear to be, first, that the infections seem to be only slightly contagious, and, second, the extreme rapidity with which infected pigs die. Only a few sporadic cases have been encountered in the course of two years.

When the author arrived at Elisabethville early in 1925, a large herd of pigs on a neighbouring farm had just been decimated by an epidemic of trypanosomiasis. It was this epidemic which provided the trypanosome described by WALRAVENS. Having established the existence of cases of porcine trypanosomiasis at Stanleyville, and also the occurrence of the same parasite at Elisabethville, the author anticipated severe outbreaks with heavy mortality. This, however, did not occur, and only a few sporadic cases were encountered.

The common form of trypanososmiasis in pigs is caused by *T. congolense*, and this runs a more or less chronic course, even in imported pigs. The three other trypanosomes encountered in pigs are *T. suis*= *T. brucei*, *T. simiae*, and *T. rodhaini*. All these produce very acute infections. It is not certain, however, that *T. rodhaini* is a valid species. According to HORNBY this is identical with *T. uniforme*, to WENYON with *T. vivax* or even *T. simiae*.

The author refers to the incompleteness of the descriptions given by WALRAVENS in his papers on *T. rodhaini*, and also remarks on disagreements in these descriptions.

The descriptions given by BRUCE and WALRAVENS respectively of *T. simiae* and *T. rodhaini* are reproduced and, summing up, Schwetz concludes that *T. simiae* very closely resembles *T. congolense*. *T. simiae* is very pathogenic for the pig and monkey. It is also transmissible to the sheep, but not to cattle or small laboratory animals, which distinguishes it from *T. congolense* and *T. brucei*.

T. rodhaini is equally pathogenic for the pig and monkey, but there is no information as to its pathogenicity for the bovine or the sheep. Morphologically *T. rodhaini* appears to be distinguished by its extreme slenderness and the possession of a fairly long free flagellum. The author is not prepared to identify the trypanosomes found, nor to create any new species. He says that the parasites appeared to occupy a position between *T. simiae* and *T. rodhaini* and to approach the former more closely.

HOEPPLI (R.) & REGENDANZ (P.). Beiträge zur Pathogenese und Histopathologie der Trypanosomeninfektionen der Tiere. **[The Pathogenesis and Histopathology of Trypanosome Infections in Animals.]** —*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Feb. Vol. 34. No. 2. pp. 67–99. With 11 text figs.

Part 2.—The authors have carried out examinations of tissues from 37 animals, including monkeys, dogs, cats, rabbits, guineapigs and hamsters. They find that as a general rule the lesions depend not so much upon the type of trypanosome as upon the duration of the infection. There are, however, certain host differences. For example, myocarditis is frequently found in monkeys, but is of rare occurrence in dogs and cats.

The most important histological changes found in the organs of animals infected with trypanosomes are: myocarditis and pericarditis with the deposition of large numbers of trypanosomes in the centres of

inflammation, degeneration of the lens of the eye, iridocyclitis and conjunctivitis with the presence of trypanosomes in the subconjunctival tissue, the ciliary body and the iris.

In the course of trypanosome infections there is a gradual replacement of lymphocytes in the spleen and lymph nodules by plasma cells and macrophages.

In cases which are likely to terminate fatally within a short period, there is a degeneration of the ganglion cells.

Collections of macrophages make their appearance in the liver and lungs, but in four of their cases there is marked parenchymatous degeneration of the liver, and sometimes small necrotic centres could be found in that organ.

The kidneys showed some damage to the epithelium of the tubes, but the glomeruli appeared to be quite normal.

Cellular infiltrations composed for the most part of small round cells with a sprinkling of plasma cells and polynuclear leucocytes occur in the heart muscle, the eye, the periportal tissue of the liver, the meninges, the choroid plexus, and in the interstitial tissues of the kidney and testicle. Trypanosomes were demonstrable in the vessels in all organs and frequently also in extravascular positions.

LAUNOY (L.), NICOLLE (P.) & PRIEUR (M.). Recherches sur la thérapie et la prévention du nagana expérimental de la souris et du chat avec le 205 Bayer-309 Fourneau. [**The Therapy and Prevention of Experimental Nagana in Mice and Cats with Bayer 205-Fourneau 309.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 630–640.

The authors give details of a number of experimental inoculations carried out with dogs, cats, mice and rabbits to show that the strain of *T. brucei* used—a Pasteur Institute strain—was fully virulent.

It was found that a dose of 0·00005 g. of 205–309 was effective for the cure of 73 per cent. of mice. In experiments concerned with the action of the drug as a protection against infection it was found that for doses ranging from 0·0001 g. to 0·0006 g. the protective action increased in a regular manner with the dose, and that each increase of 0·0001 g. increased the period of resistance by about five days. With larger doses the progression was not so regular.

In view of the possible importance that 205–309 may acquire it is clear that no definite opinion as to its value can be formed upon experiments with mice alone. Cats offer certain advantages in such experiments, because the disease lasts for some length of time and definite clinical manifestations of infection are recognizable.

A tabular statement gives the details of experiments carried out with cats, but it is a little difficult to compare the results because of the great variations in the intervals between the establishment of infection and treatment. A further point which makes interpretation somewhat difficult is the fact that this section of the paper is headed " The curative and protective action of 309 in experimental nagana in the cat," and the tabular statement also refers to 309, while the text refers to 205–309.

It would seem, however, that the authors place the minimal curative dose for the cat at 0·005 to 0·006 g. per kilog.

Used protectively in doses ranging from 0·0025 to 0·04 g., it was found that the period of resistance to infection increased with the dose of the drug used, but not in arithmetical progression.

In an addendum, reference is made to two cats which were re-infected with nagana after an apparent recovery from that disease. In both cases spontaneous recovery appeared to take place.

CORSON (J. F.). **Observations on the Infectivity of *Trypanosoma rhodesiense* in a Relapsed Case of Sleeping Sickness during Treatment with Tryparsamide.**—*Jl. Trop. Med. & Hyg.* 1930. July 1. Vol. 33. No. 13. pp. 187–188.

A relapsed case of Rhodesian sleeping sickness came under observation and the author determined to try tryparsamide, chiefly when the trypanosomes appeared in the blood, with a view to producing increased resistance. The patient had received a course of injections of Bayer 205 and later of tryparsamide.

The patient was again put under tryparsamide and daily examinations of the blood were made. Rats were inoculated when tryparsamide was given. Trypanosomes appeared several times in the blood in the course of a month and all the inoculated rats became infected; the period of incubation was 6 days.

Tryparsamide was tried on one of the infected rats, but it appeared to be without action.

VAUCEL (M.). Identification du trypanosome d'une infection humaine de laboratoire. [**The Identification of the Trypanosome in a Case of Human Infection contracted in a Laboratory.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 715–719.

A laboratory attendant, who stated that he had had to do with a strain of nagana only, contracted trypanosomiasis. The strain was transferred to and kept running in mice. In this species of animal the virulence was of the same order as that of nagana. Cross immunity tests and trypanolysis tests indicated that the parasite was actually *T. brucei*.

SICÉ (A.). Chlorurorachie et glycorachie dans la trypanosomiase humaine. [**Chlorides and Sugar in the Cerebrospinal Fluid in Cases of Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 640–650.

The author's conclusions are: The nervous phase of trypanosomiasis disturbs the equilibrium of the cerebro-spinal fluid not only in producing a more or less pronounced leucocytic reaction and an increase in the amount of albumen, but also in a reduction in the amounts of chlorides and of sugar. This diminution is an index to the condition of the lesions and the progress of the disease. It recalls the syndrome of chronic encephalitis.

It does not appear justifiable to infer that the reduction in the proportion of sugar is directly referable to its use by the trypanosomes, as the variations are not constant.

Suitable treatment tends to reduce the losses. Exceptional cases occur among incurable patients, and they should be taken as indicating the necessity of caution in prognosis.

MESNIL (F.). Sur l'adaptation des trypanosomes à l'homme. [**The Adaptation of Trypanosomes to Man.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 719–721.

Mesnil gives reasons for thinking that the occasional cases of infection of human beings with purely animal trypanosomes are due to some special condition of the individual.

The case recorded by VAUCEL supports the view that *T. rhodesiense* is in reality *T. brucei* adapted to man. On the other hand, the observation made by Mesnil with RINGENBACH in 1911, that in the laboratory *T. rhodesiense* rapidly becomes susceptible to the action of human serum, led him to think that *T. rhodesiense* was of recent adaptation to man.

The facts indicate that this adaptation may be purely accidental, and that no doubt is the reason why *T. rhodesiense* occurs sporadically.

A practical conclusion that is drawn is that all kinds of trypanosomes should be handled with the greatest caution. The chances of infection may be slight, but they are nevertheless real.

KRIJGSMAN (B. J.). Physisch-chemische onderzoekingen aan het bloed van met *Trypanosoma evansi* geinfecteerde zoogdieren. Deel 1. De waarde en beteekenis van de sublimaatreactie volgens Bennett en Kenny. [**Physico-Chemical Investigations of the Blood in Mammals infected with Surra. Part 1. The Value of the Sublimate Test of Bennett and Kenny.**]—*Veeartsenijkundige Med. No. 73. Departement van Landbouw, Nijverheid en Handel.* 34 pp. With 3 figs. 1930. Archipel Drukkerij–Buitenzorg.

In his examination of the sublimate reaction for the diagnosis of surra described by BENNETT and KENNY the author has had recourse to a special apparatus of his own design for the purpose of obtaining more accurate readings of the degree of turbidity. Essentially a strip of paper with a white band and a band which is gradually darkened from white through grey to black from one and to the other is used, and readings are taken through reaction tubes. Dilution of normal serum with distilled water increases the instability of the serum proteins, and the same is true for serum from animals infected with surra. There is, however, another factor (which the author calls X) present in surra serum which accelerates the flocculation of the globulins. The addition of perchloride of mercury to diluted serum causes a further flocculation of the protein molecules. No specific substance is flocculated in surra serum. Tannin, when added to dilute serum, produces an instability of the proteins similar to that produced by perchloride of mercury. There are, therefore, three factors in the test all tending in the same direction, namely, the flocculation of the serum proteins. These are: (1) dilution; (2) perchloride of mercury; and (3) the factor X. This factor X consists, at least, of one component which occurs in a variety of pathological conditions, namely, an increase in the concentration of lactic acid. This alone can be shown to produce a positive reaction with sublimate in diluted normal serum. The test, therefore, is not a specific one, although it may possibly have some value for the diagnosis of trypanosomiasis in camels.

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NIESCHULZ (O.) & WAWO-ROENTOE (F. K.). Ueber den Einfluss der Milz auf den Infektionsverlauf der Surra bei verschiedenen Versuchstieren. [**The Influence of the Spleen on the Course of Surra in Various Kinds of Experimental Animals.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1930. July 12. Vol. 38. No. 1. pp. 14–22.

The authors have carried out with a strain of surra trypanosomes, recently (1928) recovered from a horse in Java, series of experiments in mice, rats, guineapigs, rabbits, cats and dogs, for the purpose of ascertaining the effect of extirpation of the spleen upon the course of the disease.

In the case of mice no clear difference could be detected in its course in normal and in splenectomized animals (five mice used). In the case of rats the trypanosomes appeared in the blood on the 4th day, and whereas three splenectomized rats died between the 7th and 9th days, normal rats (two in number) died on the 11th and 12th days.

Five splenectomized guineapigs and three normal ones were compared, but it could not be found that the operation of splenectomy exercised any influence on the course of the disease.

Exactly similar results were obtained with rabbits. Two experiments were performed with cats. In the first of these two animals, both of which had had the spleen removed, were used. In one the interval between splenectomy and infection was 36 days, and in the second 23 days. The former died on the 21st day after infection and the second on the 10th day. The author believes that the longer interval elapsing after the operation was accountable for the longer survival.

In a second experiment three splenectomized and two normal cats were used. The intervals elapsing between the operation and inoculation were 54, 53 and 4 days. Trypanosomes appeared in the splenectomized animals on the 11th and 12th days, and in the controls on the 8th and 9th days. The former died in 14 to 17 days, while the latter were still alive on the 33rd day, when they were used for chemotherapeutic experiments.

The experiments with dogs have already been reported upon in a Dutch journal, and the records of the experiments are here briefly summarized. There was no difference in the period of incubation in the splenectomized and control dogs (about 8 days). The former died within 11 to 14 days after the operation, while of the controls one died on the 33rd day and the other was used for chemotherapeutic experiments on the 32nd day. The intervals elapsing between operation and infection ranged from 24 hours to 22 days. This appeared to have no influence on the course of the disease. There was continuous multiplication of trypanosomes in the blood up to the time of death, when the blood was swarming with parasites.

WILLIAMS (A. J.). **The Diagnosis of Cameline Surra.**—*Jl. Roy. Army Vet. Corps.* 1930. Aug. Vol. 1. No. 4. p. 240.

The following brief paragraphs appear in the above journal.

" The following note has been received from Brigadier A. J. Williams, Director of Veterinary Services in India :—

"A trial has been carried out of the Mercuric Chloride test, as a means of diagnosis, employed in the manner described by Bennett in the *Journal of Comparative Pathology and Therapeutics*, Vol. 42, Pt. 2, of

June, 1929. The results to date show the test to be an accurate one, and it has been adopted as a routine method. All cases so diagnosed are treated immediately with four grammes of Naganol."

NATTAN-LARRIER (L.) & NOYER (B.). Trypanosome du dromadaire et trypanosome du cheval au Maroc. [**The Trypanosome of the Dromedary and the Trypanosome of the Horse in Morocco.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 747–760.

The authors have compared these trypanosomes in a number of different ways with a view to establish whether the evidence indicates identity or otherwise.

The pathogenic properties were studied in guineapig, rat and mouse experiments. Rabbits were rejected because of the inconstant results obtained. The equine strain had been running in guineapigs for several months before the present investigations were begun. The period of incubation in guineapigs was found to be 24 to 60 days, and the disease ran its course in 5 to 6 months in the first series used. Carrying on the strain to a second series, the period of incubation became shorter, and so on until a " fixed virus " was obtained with a period of incubation of 6 to 8 days, and a total duration of 25 days. After the first series crises occurred with decreasing frequency and were of shorter duration. Post-mortem examination showed that in guineapigs of the earlier series there was marked swelling of the spleen and definite enlargement of the liver.

In rats, inoculation in series also caused reduction of the period of incubation and of illness. The " fixed virus " for rats had a period of incubation of 3 to 4 days and death occurred in 6 to 7 days. In the later passages the multiplication of the trypanosomes occurred irregularly, and there were periods of varying length when parasites were scanty, but characteristic crises did not occur. Reductions in the duration of the period of incubation and of illness occurred in consecutive series of mice, and the final periods were 2 and 6 days.

The dromedary trypanosome was obtained from a guineapig inoculated directly from a dromedary. In the first passage with guineapigs the period of incubation was very long, and the majority of them were still alive 5 or 6 months later. Blood collected from these and injected unto a second series caused infection after a period of incubation of only 6 to 11 days, and the infection ran a rapid course.

In rats, the period of incubation remained fairly constant at 4 to 5 days up to the 10th passage, but after this it became reduced to 2 to 3 days and the period of infection 3 to 5 days.

In neither rats nor mice were any crises observed: the trypanosomes multiplied in a regular manner.

It has been recorded by SERGENT and his collaborators that the dromedary trypanosome is capable of passing through the placenta to infect the foetus. Experiments with guineapigs indicated that the same thing occurred in them also. These experiments were all successful.

Parallel experiments with the equine strain in guineapigs failed to produce the same result. No evidence could be obtained that foetuses were infected.

Sensibility tests with human serum showed that the recently isolated dromedary parasite was very susceptible to the action of human serum,

while the equine trypanosome, which it is true had been running in guineapigs for some time, was far less susceptible to its action.

These results would appear to indicate that the dromedary and the horse trypanosomes of Morocco are not identical.

PANISSET (L.). La dourine. Etiologie, symptômes, lesions. [**Dourine. Etiology, Symptoms, and Lesions.**]—*Rec. Méd. Vét. Exot.* 1930. Jan.–Mar. Vol. 3. pp. 21–28.

This paper is a summary of existing knowledge.

ADLER (S.) & THEODOR (O.). **The Inoculation of Canine Cutaneous Leishmaniasis into Man and the Behaviour of Various Strains of Leishmania in Mice.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 197–210. With 5 figs. on 2 plates.

The authors have previously pointed out that there appear to be two types of centres of leishmaniasis both cutaneous and visceral, one in which both human beings and dogs are affected, and the other in which only human beings are involved. In the former type of centre, infants under one year are frequently affected. It would appear to be certain that in this type of centre infection is by bite, as infants and dogs cannot crush sandflies.

Up to the present the relationship between the human and canine diseases has been investigated experimentally only from the point of view of transmitting human leishmaniasis to dogs. Human strains from centres where the disease is confined to man produce a disease in dogs resembling the naturally contracted infection.

Working with a strain isolated from a natural case of cutaneous leishmaniasis in a dog by MCHATTIE, the authors have inoculated a volunteer with cultures and the flagellates in experimentally infected *P. papatasii*. Papules developed at the points of inoculation with sandfly flagellates, but no parasites were found. The papules disappeared in about 6 weeks. At the site of inoculation with culture papules appeared in about 5 weeks, and leishmania were found and positive cultures obtained. About 6 months after inoculation one papule was excised for histological examination.

The authors have frequently had negative results on inoculating human beings with the Palestine strain of the canine parasites, and they suggest that a possible factor in obtaining a positive result with the Baghdad strain is that that strain is probably transmitted by *P. sergenti* and not by *P. papatasii* as in Palestine.

Cutaneous leishmaniasis has not yet been found in Palestine, but this is not because the Palestine strains are not infective for dogs, as experimental transmissions of cultures and infected fleas to dogs have produced cutaneous lesions. Large doses of culture were required to produce infection.

The histology of the lesion produced in man with the dog strain was similar to that of the naturally occurring human cutaneous lesion.

Experiments with mice.—Cultures of *L. tropica* were injected subcutaneously into the tail until the skin was distended. The skin was then scarified at different places. Lesions appeared on the scarifications and were rich in parasites from the 5th day onwards. The parasites were much larger than those in human lesions.

Twenty-six mice were inoculated in the same way with the Baghdad dog strain, and they remained negative during a period of observation of six weeks to seven months.

A strain of visceral canine leishmania from Tunis (Nicolle) produced progressive lesions in nearly every mouse inoculated.

Nine mice were inoculated with a strain which had been passed from a child in Naples through a dog—the bone marrow being used—and no infection developed (observed for a year). A similar result was obtained when cultures of the Naples strain were used.

The authors give accounts of further experiments which go to show that the results of experimental inoculation of animals must be interpreted cautiously. It must not be concluded that the human and canine Baghdad strains are different from the Palestine strain because of their different infectivity for mice ; nor must it be concluded that the Palestine strain of *L. tropica* is identical with the Tunis strain of visceral canine leishmaniasis because they produce cutaneous lesions in mice.

PARROT (L.), DONATIEN (A.) & LESTOQUARD (F.). Sur le développement du parasite de la leishmaniose canine viscérale chez *Phlebotomus major* var. *perniciosus* Newstead. [**The Development of the Parasite of Visceral Canine Leishmaniasis in** *Phlebotomus major* **var.** *perniciosus* **Newstead.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 724–726.

For many years the authors have been examining *Phl. perniciosus* fed upon dogs affected with visceral leishmaniasis to see whether they could discover any evidence of developmental phases. No positive results were obtained during 1928 and 1929, although the dogs were proved to be infected by examination of spleen pulp and bone marrow. These dogs showed no cutaneous lesions.

During the present year they have employed in their experiments a dog having cutaneous lesions in addition.

Phl. perniciosus was present in large numbers in the kennel, and each day engorged females were caught and placed in a moist atmosphere at 24° C. These flies were dissected, beginning on the day after they were caught.

There were found in the stomachs of four flies, out of 53 caught in three days, large numbers of actively motile leptomonas presenting the characters of the cultural form of the parasite of visceral leishmaniasis. Up to the present, flagellates have not been found in any part of the alimentary tract of the flies other than the stomach.

Phl. perniciosus is known to bite human beings and dogs indiscriminately, and the authors believe that their experiments throw light upon the origin and spread of visceral infantile leishmaniasis, at least in so far as Northern Africa is concerned.

ADLER (S.) & THEODOR (O.). **The Behaviour of Insect Flagellates and Leishmanias in** *Phlebotomus papatasii.*—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 193–196.

The authors find that there is a close biological relationship between strains which behave similarly in *P. papatasii*. All the strains which tend to ascend to the top of the cardia and attach themselves to the rhabdorium are closely related serologically. These are *L. tropica*, *L. donovani*, *L. brasiliensis*, and *L. tarentolae*.

NITSCHE (O.). Die pathologischen Veränderungen in der Milz bei Vogelmalaria. [**The Pathological Changes in the Spleen in Bird Malaria.**]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1929. Nov. 25. Vol. 60. No. 5. pp. 410–425. With 3 coloured figs. in text.

In cases of bird malaria there is to be found, by the eighth day, commencing hyperplasia of the lymph follicles in the spleen. No deposition of pigment is to be found.

At two to three weeks the hyperplasia is pronounced, and pigment is recognizable in the large mononuclear leucocytes and in the cells of the reticulo-endothelial system. At three weeks the follicles have become reduced in size, but there is an increase in the fixed cells (monocytes and splenocytes) and the free cells (mononuclear leucocytes and macrophages). By the fourth week swelling of the spleen decreases and the chronic stage with induration sets in.

YAKIMOFF (W. L.). Der Kampf gegen die Piroplasmose der Rinder im Leningrader (Petrograder) Gouvernement. 6. Abhandlung: Ergebnisse eines fünfjährigen Vorgehens. [**The Campaign against Bovine Piroplasmosis in the Leningrad Province.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1930. May 12. Vol. 37. No. 3/4. pp. 197–204.

This paper contains tabular statements of the number of cases of piroplasmosis treated in various ways in the period 1923–1927 (five years). A summarized statement is given as follows :—

The mortality due to babesiellosis in the Lodeinopol area in untreated animals was 1925=39·8 per cent., 1926=50–60 per cent., 1927=40 per cent.

In animals treated in various ways the percentage mortalities during the same years were 1925=5·9 per cent., 1926=10 per cent., 1927=10·4 per cent.

CHARBONNEL. De la Babésiellose bovine en Vendée. [**Bovine Babesiellosis in Vendée.**]—*Rec. Méd. Vét.* 1930. July. Vol. 106. No. 7. pp. 409–413.

For many years Charbonnel has seen cases of redwater in the marshy districts of the Vendée after the animals have been turned out to pasture, that is to say, between the end of April and July. It has been a constant observation that the cases are mild in animals bred locally and severe in imported animals.

Although cattle owners laid the blame on some plant occurring in the pastures, the author suspected an invasion of some blood parasite, more particularly as Ixodes were almost invariably found on the diseased animals.

The submission of blood smears to expert examination established the diagnosis of babesiellosis.

Treatment with trypanblue was not persisted with after two animals had been treated, because one of these died, and the other, although it actually recovered eventually, was very seriously ill for several days.

The treatment recommended by CERNAIANU, of Roumania, 20 grammes of urotropine in 30 cc. of distilled water, has been used in 15 cases. Ten of these would, in the author's opinion, have recovered without

treatment, but the remaining five would in all probability have died but for the treatment administered. In each case two injections were given on consecutive days.

DONATIEN (A.) & LESTOQUARD (F.). De la classification des piroplasmes des animaux domestiques. [**The Classification of the Piroplasms of the Domesticated Animals.**]—*Rec. Méd. Vét. Exot.* 1930. Jan.–Mar. Vol. 3. pp. 5–20. With 2 text figs.

In tabular form the authors' classification is as follows :—

Family PIROPLASMIDAE.

Genus *Piroplasma*
- Sub-genus *Piroplasma*.
  - *P. bigeminum.*
  - *P. ovis.*
  - *P. caballi.*
  - *P. canis.*
  - *P. trautmanni.*
- Sub-genus *Babesiella*.
  - *B. bovis.*
  - *B. argentina.*
  - *B. berbera.*
  - *B. major.*
  - *B. ovis.*

Genus *Nuttallia*
- *N. equi.*

Family THEILERIDAE.

Genus *Theileria*
- *Th. mutans.*
- *Th. parva.*
- *Th. dispar.*
- *Th. ovis.*
- *Th. recondita.*

Family ANAPLASMIDAE.

Genus *Anaplasma*
- *A. marginale.*
- *A. ovis.*

BARNETT (G.). **The Treatment of Equine Piroplasmosis (Biliary Fever) by Intra-Muscular Injection of Quininae Hydrobromidum Acidum.**—*Jl. Roy. Army Vet. Corps.* 1930. May. Vol. 1. No. 3. p. 178.

No originality is claimed by the author for the method of treatment, but the note is published as being of possible assistance to those who have not had need to apply the treatment frequently, and those who are not in favour of the intravenous route.

The dose injected is :—

Acid hydrobromide of quinine ...	1 dr.
Sodium chloride	30 grs.
Distilled water	2 ounces.

and it is injected at a point about 6 inches below the tuber ischii, and in a slightly downward direction.

A fall of temperature follows within 24 hours, but should it rise again—as sometimes happens in three or four days—another injection may be given. In no case in the author's experience have more than two doses been necessary.

CARPANO (M.). Su di un piroplasma osservato nei polli in Egitto, (*Aegyptianella pullorum*). Nota Preventiva. [**Piroplasm found in Poultry in Egypt** (*Aegyptianella pullorum*).] **Preliminary Note.**— *Ministero di Agric. Egitto. Serv. Tecn. e Scient., Serv. Vet. Boll. No. 86.* 12 pp. With 3 plates. 1929. Cairo: Govt. Press. [P.T.S.]

The author describes an intracorpuscular parasite occurring in the blood of native and of imported poultry. The organism is piroplasm-like and shows all the usual variations of shape and size encountered in piroplasms. Multiplication appears to take place by a process of multiple division, and as many as 19 merozoites have been seen originating from a single parasite. The parasites range from 1 to about 4 μ in size.

In imported birds the percentage of invaded corpuscles may be as high as 10 per cent. but in native birds it is generally considerably lower.

Nothing is known with certainty up to the present regarding the natural method of transmission of the parasite. Experimentally, the infection can be transmitted by inoculation with blood. Little is known at present regarding the clinical course of the disease, but it would appear that both acute and chronic forms occur, the former of which is usually fatal. Icterus, anaemia, enlargement of the spleen, petechiae of the serous membranes, and a gelatinous infiltration in the coronary furrow are the lesions found.

CARPANO (M.). Sur la piroplasmose des oiseaux domestiques déterminée par *Aegyptianella pullorum*. Deuxième note. [**Piroplasmosis of Domestic Birds caused by** *Aegyptianella pullorum*.]— *Ann. Parasit. Humaine et Comparée.* 1929. Sept. 1. Vol. 7. No. 5. pp. 365–366.

The purpose of this brief note is to record the fact that the author has found that *Aegyptianella pullorum* is capable of infecting the goose and causing both the acute and the chronic form of the disease. The parasite may occur in the blood in a state of purity, or it may be associated with *Spirochaeta anserina* (which the author believes is identical with *Spirochaeta gallinarum*). It appears to be probable that *Argas persicus* is the transmitting agent of both parasites. There is evidence to show that diseases, and particularly those caused by filterable viruses, may cause relapses to these two parasites.

THEILER (A.). Un nouveau médicament pour le traitement des piroplasmoses. [**A New Drug for the Treatment of Piroplasmoses.**]— *Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 506–529. With 22 text figs.

The author points out that trypanblue has had a wide application in the successful treatment of piroplasmosis both natural and experimental. But, more particularly since the war, there have appeared on the market substances called trypanblue which not only are devoid of any parasiticidal action, but are liable on injection even by experienced persons to produce alarming symptoms of shock. In the course of a tour in Queensland two years ago Theiler heard it said that trypanblue was quite useless for the treatment of redwater as it occurred in that country.

This fact caused the author to decide upon the publication of the results which he obtained at Onderstepoort in 1925 and 1926 with a new drug which he calls " Piroblue." The experiments carried out in the Sandoz laboratories by MÜLLER have shown that the parasiticidal action of stains such as trypanblue and others can be greatly increased if they are combined in an appropriate form with the bile acids. This combination can be effected without producing any proportional increase in their toxicity.

The bile acids and their salts possess no parasiticidal power of their own, but their association with pure trypanblue renders it possible to reduce the dose of the drug to a point at which toxicity does not come into consideration at all. Not only so, the parasiticidal action is actually increased.

According to STOLL, the explanation of this effect is probably as follows: Bile acids exert a profound effect upon the surface tension of liquids containing them. This fact is made use of commercially in dyeing, and this property enables drugs combined with them to come into closer contact with parasites.

Two compounds, which are called T18 and T19, were used for experiment. These were composed of the pure dye and sodium cholate in different proportions. These compounds possessed similar properties, and it was decided to make one intermediate in composition between these for commercial application.

The toxicity of " Piroblue " was tested upon mice, but, in spite of the use of a large series of animals (nearly 100) the results were, for some unknown reason, discordant.

A series of guinea-pigs was placed under test by intravenous injection. In the majority of cases a 5 per cent. solution was used, and doses were graduated so as to give 0·1 g. per kilog. upwards. In this series concordant results were obtained, and the toxic dose by intravenous injection was found to be 0·19 g. per kilog.

Full details are given of twelve observations carried out on pure-bred Polled Angus cattle, five upon African native bred animals obtained from areas free from piroplasmosis, and five upon horses. Four of the latter were animals undergoing hyperimmunization against horse sickness, the other a sporadic case. One of the animals was infected with *P. caballi*, and the other four with *Nuttallia equi*. The whole of the seventeen bovines used were infected artificially with *P. bigeminum*. Of the twelve Scotch animals six developed haemoglobinuria, as did also two of the African cattle. The blood used was therefore of considerable virulence. The majority of animals also developed high fever.

Both compounds T18 and T19 were used, in 1 and 2 per cent. solutions, and doses of 100 cc. for adults and 50 cc. for calves were given intravenously. In no case was any evidence of shock observed. One of the African cattle was given 50 cc. of 4 per cent. solution of T18 without producing trouble of any kind.

In every case the temperature promptly fell and parasites disappeared from the circulation within 24 hours, and there was a rapid and surprising improvement in condition. In one case death occurred, but the calf in question should not have been put under treatment, as it was suffering from a paratyphoid infection.

T18 and T19 do not produce complete sterilization as is shown by the fact that in eight instances parasites reappeared in the blood in small numbers some days after their first disappearance. This is not an undesirable result, because premunization against piroplasmosis depends

upon the persistence of the parasite in the blood. The new drug is suitable therefore for use in the premunization of animals, and it can be given without risk to valuable imported animals. The possibility of using solutions up to 4 per cent. strength permits of a reduction in the amount of liquid injected to reasonable proportions.

Until further experimentation has furnished fuller information Theiler recommends the following doses :—

For calves or slight cases :—
50 cc. of a 2 per cent. solution in water.
or 100 cc. of a 1 per cent. solution in water.
For serious cases in adult animals :—
50 cc. of a 4 per cent. solution in water.
or 100 cc. of a 2 per cent. solution in water.

All the animals treated in the experiments had been infected by the injection of virulent blood, but the author sees no reason why similar results should not be obtained in naturally contracted cases.

The four cases of equines infected with *Nuttallia equi* were all cured, but Theiler recommends caution for the time being in drawing conclusions as to the efficacy of the drug against this parasite. The first case treated was a severe one and two injections were necessary to cause the disappearance of the parasites. In the other cases the disappearance of the parasites was not immediate, and the temperature remained high for 24 hours after the injection. It must, therefore, be concluded that the drug is probably less active against Nuttallia than against Piroplasma. The fact that a case of nuttalliasis with haemoglobinuria recovered after two injections is sufficient to recommend the use of the drug, more particularly because up to the present no known drug has been of any value for the treatment of this condition.

It is suggested that Piroblue will probably prove effective against canine piroplasmosis and against diseases caused by Babesiella, but the author notes, without giving any details, that it is quite without action on *Theileria parva* and Anaplasma.

CARPANO (M.). Sulla trasmissione della febbre della costa orientale (theileriosi da *Theileria parva*) a mezzo del sangue circolante e qualche considerazione sulla differenziazione della *Theileria parva* dalla *Theileria annulata*. [**The Transmission of East Coast Fever (Theileriasis due to** *Theileria parva*) **by means of Circulating Blood, and Certain Considerations regarding the Differences between** *Theileria parva* **and** *Theileria annulata*.]—*Clin. Vet.* 1930. May. Vol. 53. No. 5. pp. 261–268. With 2 figs.

The author quotes various writers on the subject of theileriasis and concludes that tropical piroplasmosis, East Coast Fever, theileriasis due to *T. dispar*, etc., are all one and the same condition, and are caused by *Theileria annulata* Dschemkowsky and Luks 1904.

LEASURE (E. E.). **Anaplasmosis in Kansas.**—*Cornell Vet.* 1930. July. Vol. 20. No. 3. pp. 304–306.

Anaplasmosis has been known in Kansas since 1925, and the losses due to it during 1927–28 are estimated at half a million dollars.

SATO (Shinich). **On the Hemotoxin of the Sarcosporidia.**—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 225–235.

The author finds that *Sarcocystis blanchardi* (from the Formosan buffalo) contains both a haemolysin and haemagglutinin.

The suspension of red corpuscles used for the demonstration of these bodies should be between 2·5 and 5 per cent.

The haemolysin possesses the following characteristics. It is scarcely soluble in water, saline or glycerin saline, soluble in alcohol and ether, thermostable, negative to the protein reaction test. The haemagglutinin is soluble in water, saline and glycerin saline, insoluble in alcohol and ether, thermolabile at 85° C. for half an hour, and positive to the protein reaction test. Beyond a certain concentration normal serum inhibits the haemolysis. The lecithin fraction of serum accelerates haemolysis, but the albumen and globulin fraction of serum inhibit the haemagglutinin.

FORSYTH (W. L.) & GOHAR (M. A.). **Leptospira in the Rat in Egypt.**—*Jl. Trop. Med. & Hyg.* 1930. July 1. Vol. 33. No. 13. p. 191.

The authors have examined 64 rats in the course of three months. The technique was as follows :—

(1) Emulsion of one kidney in saline searched under dark ground illumination for 15 minutes.

(2) Guineapig inoculated with 1 cc. of emulsion.

(3) Kidney smears fixed in methyl alcohol and stained with Giemsa.

(4) Kidney used for modified Levaditi method (Warthin Starry).

(5) Emulsion sown on Damon dilute agar tap-water medium. Plates incubated at 23° C. and 37° C.

The rats examined were *Rattus rattus alexandrinus*. Leptospira were found in very small numbers in two rats but guineapigs failed to become infected on inoculation.

The authors conclude that this species of rat is not infected.

DISEASES DUE TO METAZOAN PARASITES.

DAUBNEY (R.). **Miscellaneous Experiments with Anthelminthics, Chiefly Alkyl-Chlorides, in the Treatment of Nematode Infestations of Sheep.**—*Vet. Jl.* 1930. Jan. Vol. 86. No. 1. pp. 5–30.

In Kenya the author finds that the most serious parasitic pest of sheep is *Bunostomum trigonocephalum*. This worm causes heavy losses among animals up to 1 year of age, and the losses appear to be more serious among lambs born in the May lambing season than those of the October season.

The experiments with drugs which the author records have been spread over about 4 years and were carried out as animals became available. The whole of the results are given in tabular statements showing the dosage, worms passed, worms collected at post-mortem and the percentage efficiency against hookworm and against other species.

Preliminary experiments with solution of fuchsin shewed that there was a better chance of getting liquids into the abomasum if a stomach tube were used, and this was passed to the fullest possible extent. This was not the case when the tube was introduced into the oesophagus only.

Carbon tetrachloride in doses of 0·1 cc. per lb. body weight given by the stomach tube was 91 to 100 per cent. efficacious against the hookworm, but four out of nine animals treated died as a result of the administration.

Smaller doses of the drug in gelatin capsules produced no fatalities, but a single dose of 3 cc. given in capsules was the smallest efficient dose. The administration of a comparatively large dose of magnesium sulphate immediately (3 ozs. in saturated solution) after the carbon tetrachloride appeared to be quite effective for the prevention of any toxic action without altering the anthelmintic action. It is important to note that this drug had no effect upon *Oecophagostomum columbianum* or against Ostertagia and Trichostrongylus. Tetrachlorethylene and hexachlorethane appeared to be variable in their efficacy.

Tetrachlorethane, pentachlorethane, and trichlorethylene were all very toxic.

Sodium-trichloracetate, ethyl-trichloracetate, and para-dichlorbenzene were quite valueless for any of the gastro-intestinal round worms. Copper sulphate, tobacco infusion, turpentine, and linseed oil failed to expel hookworms.

The intravenous injection of oil of chenopodium is too dangerous to be practicable.

POISSON (H.). Notes sur la syngamose des volailles à Madagascar. [**Syngamosis of Birds in Madagascar.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 681–682.

The author states that *Syngamus trachealis* has been known to occur in Madagascar for a long time, and serious outbreaks of disease due to it have occurred at intervals since 1911.

The intratracheal injection of 1 cc. of 5 per cent. salicylate of soda and the addition of 0·1 per cent. salicylic acid to the drinking water are valuable in treatment.

SUGIMOTO (M.). **On the Elephant Louse** (*Haematomyzus elephantis* **Piaget, 1880).**—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 259–263. With 2 plates (1 coloured). [In Japanese. English summary.]

The author gives four points of difference between the female louse found by him on an Indian elephant at the Maruyama Zoological Gardens at Taihoku and that described by PIAGET.

SCHWETZ (J.). **Some Ecological Notes on** *Glossina newsteadi* **Austen.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 211–216. With 1 map in text.

From an ecological point of view *G. newsteadi* appears to occupy a place intermediate between the *G. palpalis* and the *G. fusca* groups. It occurs normally on the banks of rivers with *G. palpalis*, but also at

a distance from water with *G. fusca* and *G. tabaniformis*. Its kinship to *G. fusca* is also indicated by its activity morning and evening. It is sometimes caught during broad daylight.

The author states that "although from a morphological point of view *G. newsteadi* belongs to the *G. palpalis* group, it is distinguished from most species of this group by its greater size and by its lighter colour, which allies it to the *G. fusca* group." In this connexion the author has requested the insertion of a footnote by AUSTEN who states, "In pinned specimens, at any rate, no such difference is apparent. The museum examples of *G. newsteadi* are just as dark as those of *G. caliginea* and darker than those of *G. pallicera*. Moreover, there is certainly no constant difference in size."

SMIT (Bernard). **The Sheep Blow-Flies of South Africa.**—*Union of S. Africa. Dept. Agric. Bull. No. 47.* 27 pp. With 12 figs. & 4 plates (3 coloured). 1929. Pretoria: Govt. Printer.

The author describes in popular language the flies attacking sheep, their life histories, methods of dealing with sheep carcasses, and of trapping flies. Some of the methods and traps have been described before.

MOUTIA (André). **Flies injurious to Domestic Animals in Mauritius.**—*Dept. Agric. Mauritius Bull. No. 15.* Scientific Series. pp. 5–8. With 6 figs. on 2 plates. 1930. Port Louis: Govt. Printer.

By far the most frequent cause of myiasis in Mauritius is "*Chrysomia putoria*," the green bottle fly. *Sarcophaga haemorrhoidalis*—the grey flesh fly—is responsible in only 2 or 3 per cent. of cases. The author gives descriptions of these and an account of their life histories. Motor spirit is, according to the author, the most effective material for treatment. Iodoform, carbolic ointment, and tar mixed with benzene or tincture of aloes are good repellents. A considerable reduction in the number of flies can be effected by means of suitable traps.

Stomoxys nigra is, according to the author, the agent concerned in the transmission of Surra in Mauritius, and he finds it is also the cause of ophthalmia of bovines. From December to March animals at pasture are harassed by these flies which bite the eyelids. Conjunctivitis occurs and the inflammation spreads to the cornea, which becomes opaque. An animal may become completely blind in 12 days.

FLETCHER (T. B.) & SEN (S. K.). **A Veterinary Entomology for India, Part XI.**—*Jl. Cent. Bur. Animal Husband. & Dairying in India.* 1930. Apr. Vol. 4. Pt. 1. pp. 1–5. With 3 plates (1 coloured).

KAUZAL (G.). **A Survey of the Helminth Parasites of Swine in New South Wales.**—*Australian Vet. Jl.* 1930. June. Vol. 6. No. 2. pp. 51–56.

BACTERIAL DISEASES.

WEINBERG (M.) & MILHAILESCO (M.). Recherches sur le charbon symptomatique et le *B. chauvoei*. [**Investigations of Blackquarter and** *Bacillus chauvoei*.]—*Ann. Inst. Pasteur.* 1929. Nov. Vol. 43. No. 11. pp. 1408–1464.

Blackquarter in cattle is a "haemorrhagic emphysematous traumatosis" characterised by one or more crepitating "tumours" in the muscular and connective tissues.

Although caused most frequently by *B. chauvoei* the pathogenesis of the disease is very variable. Vibrion septique, *B. perfringens*, *B. oedematiens*, and other anaerobic organism may cause it, either alone or in combination with each other.

There is a classical type of *B. chauvoei* possessing certain biological characters, but even this most specialized type remains associated with its original species—vibrion septique—through antibodies which are common to both.

Anti-vibrion-septique serum neutralizes, provided sufficiently large doses be used. The classical type of *B. chauvoei* is of comparatively rare occurrence; organisms which differ in one or more ways from this bacillus are encountered with far greater frequency. In fact, in examining a large number of cases which present the classical features of blackquarter one can isolate a whole series of organisms ranging from the typical *B. chauvoei* to *V. septique*.

These investigations, whatever may be their theoretical interest, do not involve any important changes in the method of vaccination against blackquarter, but logically one should increase the chances of success by employing a polyvalent vaccine, whatever the exact method of preparing it may be. The authors urge the necessity of using large doses of polyvalent anti-serum by intravenous injection for the treatment of cases which are clinically typical cases of blackquarter.

PANISSET (L.). La fièvre charbonneuse. Considérations relatives à la maladie dans nos possessions d'outre-mer. [**Anthrax. Considerations regarding the Disease in French Over-Seas Possessions.**]—*Rec. Méd. Vét. Exot.* 1930. Apr.–June. Vol. 3. pp. 65–76.

This paper has as a sub-title "Considerations regarding the disease in our over-seas possessions," and although it has been generally held that anthrax occurs in all parts of the world, our knowledge of its distribution is still incomplete. It was long held that Algerian sheep were not susceptible to anthrax, but it is known that it attacks sheep in the neighbourhood of Constantine.

Anthrax is known to occur in French West Africa, Madagascar, and Indo-China.

Strains of anthrax isolated in various colonies closely resemble strains isolated in France, but it is worthy of note that anthrax bacilli of Algerian origin possess a higher pathogenic power than French strains. It has long been known that Algerian sheep could scarcely be infected with a strain of French origin and from this it was wrongly

deduced that anthrax did not occur in sheep in Algeria. It is quite within the bounds of probability that the anthrax bacillus as it occurs in West Africa is more pathogenic than the French strains.

All observers agree that in Algeria, Morocco, and Indo-China anthrax runs an extremely rapid course, so rapid that there may be no recognizable lesions. MARIN and HENRY record that the spleen may be practically normal in colour and size. In pigs swelling of the throat is not invariably observed, and in such cases diagnosis is rendered difficult because the spleen may be normal in size and bacilli present in the blood in very small numbers only. Anthrax in the camel resembles the disease in bovines, but " external anthrax " in which painful swellings appear on different parts of the body is of common occurrence. In the elephant painful swellings also occur, and it is recorded (HOWARD, 1913) that the bacillus can be found in the blood in small numbers many hours before death takes place.

The fulminating form of the disease may occur in the ostrich, the only bird which is naturally attacked, but cases occur in which the birds are visibly ill for a day or two. The spleen may not be affected, but there is usually a considerable amount of pleuro-peritoneal exudate.

With regard to the control of anthrax by vaccination, the author says that the problem of vaccination with a single injection is far from being solved in a general manner, but the intradermal injection of Pasteur 2nd vaccine or Theiler's spore vaccine appears to be an improvement. Horses and goats which are so difficult to vaccinate by Pasteur's method can be immunized by the intradermal injection of the first and second vaccine. Vaccination against anthrax in French West Africa has been compulsory since 1925.

JACKSON (R.). **The Introduction into Great Britain of Anthrax Infection by Means of Products of Animal Origin.**—*Jl. Comp. Path. & Therap.* 1930. June. Vol. 43. No. 2. pp. 95–98.

This paper is based upon details published annually in the Report of the Animals Division of the Ministry of Agriculture and Fisheries, and is published because the subject has been tabled for discussion during the 1929 Session of the Committee of the Office International.

A table covering the last ten years is published. This gives details of the circumstances attending outbreaks, but is not to be taken as a table of origins.

80 per cent. of outbreaks have occurred on premises upon which the disease has not existed during the previous 5 years, and it is therefore reasonable to suggest that the disease has been introduced from outside.

The use of artificial feeding stuffs is very frequently associated with outbreaks on non-infected premises. Artificial manures appear to be connected with outbreaks in a far smaller proportion of cases.

In only a small proportion of cases can outbreaks be connected with commercial effluents.

SHAW (G. K.). **An Outbreak of Atypical Anthrax.**—*Jl. Roy. Army Vet. Corps.* 1930. May. Vol. 1. No. 3. pp. 180–183.

At a military dairy at Jubbulpore there were sick at one time 22 animals (heifers and buffaloes) of which 3 heifers and 1 buffalo died.

The symptoms in all cases were high temperature, colic, foetid diarrhoea, which was streaked with blood, acute conjunctivitis, and serous discharge from the nostrils.

Blood smears examined shortly after death failed to reveal the presence of anthrax bacilli, but in films made some hours after death they were readily found.

In the first case a post-mortem examination was made, because blood examination had proved negative. The lesions found were: blood stained exudate in the abdominal cavity, acute enteritis, spleen blackish in colour and about twice the normal thickness, blood stained exudate in the thorax, hepatization of the lungs, pleura inflamed, glands haemorrhagic.

Bacteriological examination of swabs taken some hours after death, carried out at Muktesar, confirmed the disease as anthrax.

BORDET (J.) & RENAUX (E.). L'influence du calcium sur l'évolution des cultures de charbon. [**The Influence of Calcium on Anthrax Cultures.**]—*Ann. Inst. Pasteur.* 1930. July. Vol. 45. No. 1. pp. 1–25. With 11 coloured figs. on 1 double plate.

In this paper the author gives a minutely detailed description of the types of colony occurring in anthrax cultures on ordinary agar, and of the changes which develop on agar deprived of calcium and agar with calcium added. The original must be consulted by those interested.

AMANSCHOULOFF (S.), ARBOUSOFF (P.) & SCHURAVLEFF (A.). Die Hyperimmunisation der Kamele und die Gewinnung von Milzbrand-Schutzserum von ihnen. [**Hyperimmunization of Camels and Anti-Anthrax Serum obtained from them.**]—*Ztschr. f. Injektionskr. d. Haustiere.* 1930. July 12. Vol. 38. No. 1. pp. 42–49.

Up to the present there appears to be no record of attempts to hyper-immunize camels for the purpose of obtaining anti-anthrax serum. The authors have carried out experiments at the Veterinary Laboratory at Kasakstan (Urals) to find out whether this can be done. As the camel is susceptible to anthrax, it appeared that it would probably react to hyper-immunization and produce a serum with protective properties.

The available reports show that anthrax appears to be on the increase in the Urals. For the year 1926/27 it is reported that 2,000 domesticated animals died of the disease and that 200 human beings contracted it.

Money was not available for carrying out proper measures of control nor for the purchase of horses for anti-anthrax serum preparation. There were available, however, a number of camels which remained over from Bayer 205 experiments. By the use of camels in place of horses the author points out that there is a saving (amounting to about 25 per cent.) in the cost of keep, and also that owing to its greater weight a larger amount of serum can be obtained from the camel.

As it was urgently necessary to get supplies of anti-anthrax serum an intensive hyper-immunization which lasted only 1½ to 2 months was carried out.

A tabular statement shows the process of hyper-immunization. Twelve doses of Cenkowsky Vaccine II in doses ranging from 0·5 to 45 cc. were spread over 23 days. A series of doses was given on several consecutive days and then after a short interval a further series of increasing doses was given. Then increasing doses of culture ranging from 0·1 cc. to 200 cc. of anthrax growth were given on seven occasions in the course of three weeks. The cultures were in some instances 24 hours old, and in others 48 hours old, in order to immunize against bacilli as well as spores. About 100 strains of anthrax were used in order to make the serum as polyvalent as possible. Five strains were obtained from horses, 10 from cattle, 5 from sheep, 2 from human beings, and the remainder were isolated from a large number of raw hides (18,000) which had been obtained for the investigation of anthrax.

It was considered that hyper-immunization was completed when the injections caused no rise of temperature and abscesses developed at the seat of injection.

Two camels were hyper-immunized.

The camels were rested for 12 days after blood was withdrawn, and 5–6 cc. of "bacterial mass" (obtained by centrifuging) were injected. After a further interval of 13 days bleeding was again carried out.

At first only 8 to 10 litres of blood were withdrawn per month. Two bleedings of 12 and 15 litres were found to be excessive and subsequently the amount taken was 14 litres per month. This caused no disturbance.

The coagulation of the blood and the sedimentation of the corpuscles takes place more slowly in camel blood than in horse blood. The maximum yield of serum was 45 to 48 per cent.

The sterility of the serum was tested by inoculation of broth. The possibility of the serum exerting a toxic action on bovines and equines was tested by injecting doses of 100 cc. and 50 cc. into calves and 100 cc. and 250 cc. into horses. Beyond a transitory rise of temperature in some of the animals nothing occurred.

Tested upon rabbits the serum was found to be protective against an inoculation with virulent material in an amount of 2 cc. per kilogramme body weight.

No details are given of the use of this camel serum in the field, but the authors say that the reports of veterinary surgeons speak as to its value.

MAGALLON. La fièvre ondulante d'origine bovine en Isère. [**Undulant Fever of Bovine Origin in Isère.**]—*Rev. Gén. Méd. Vét.* 1930. Aug. 15. Vol. 39. No. 464. pp. 449–456.

In spite of statements made recently to the effect that the risk of human beings contracting infection with *Br. abortus* from bovine sources are negligible, the author is by no means so optimistic.

The author gives details of eight cases of infection in human beings, and with the exception of one of these, goats are not concerned. The eight cases reported do not comprise the whole of the author's observations, as he says he could multiply cases.

Although it is stated that goats are concerned in only one of these cases, these animals appear to have been on the premises where the cases occurred in several of the instances given.

He appears to imply that the infections among cows in his area are due not to *Br. abortus* but to *Br. melitensis*.

CONTE (A.). La fièvre ondulante, maladie professionnelle vétérinaire. [**Undulant Fever, an Occupational Disease of Veterinary Surgeons.**]—*Rev. Gén. Méd. Vét.* 1930. June 15. Vol. 39. No. 462. pp. 321–324.

The author, who is Inspector General of Veterinary Services, publishes the results of an enquiry carried out in south-eastern France regarding the prevalence of undulant fever among veterinary surgeons.

It was found in the first place that cases occurred in certain Departments: Pyrénées-Orientales, Aude, Gard, Var, Basses-Alpes and Hautes-Alpes. These are the areas where the sheep and goat populations are the most dense. The first case was detected in 1910, and since then twelve other cases have been encountered; ten of these since 1924. In practically every case the circumstances have been practically the same, namely the handling of sheep or goats which have aborted. In some cases farm hands helping the veterinary surgeon have also become infected. In one instance neither sheep nor goats were concerned, but the veterinary surgeon had been called upon to intervene at a parturition on premises where several cases of abortion had occurred.

The enquiry showed that the period of incubation ranged from a fortnight to three weeks. Recovery took place in every case.

GILMAN (H. L.). **The Elimination of *Bact. abortus* in the Milk of Cows.** —*Cornell. Vet.* 1930. April. Vol. 20. No. 2. pp. 106–122.

The author briefly summarizes the earliest literature regarding the presence of abortion bacilli in milk. The part which may possibly be played by the presence of abortion bacilli in the milk in the spread of the disease from cow to cow is not well understood, but it is certainly likely that infection may be spread from one quarter of the udder to another by the hands of the milker. The great majority of calves are free from actual infection at birth, although the bacillus may be in the alimentary canal, and their blood invariably gives a negative reaction to agglutination tests at birth. The subsequent development of a capacity to react on the part of calves from infected cows is "due to direct agglutinin absorption." It is rare for infection to occur in a calf and to persist until sexual maturity. The lymph glands in the throat region may become invaded by the bacillus, but permanent infection rarely occurs. Milk from actively infected udders may have a cellular content up to five times as large as the normal average, and this probably accounts for high cellular counts in milk drawn from apparently healthy udders.

Observations indicate that infection of the udder with abortion bacilli reduces the milk flow, and also that udders so infected are more likely to develop mastitis.

Reference is made to the work done in the United States from 1911 onwards, regarding the occurrence of agglutinins for *Br. abortus* in the blood of human beings.

The resistance of human beings to infection with *Br. abortus* is by no means completely understood, nor is it known whether certain strains are of definite pathogenic importance.

The author advocates pasteurization as the safest and surest method of eliminating the danger from infection with the abortion bacillus, but he also indicates that by means of the agglutination test of cattle herds can be, and have been, freed from the disease. The clearing of large numbers of herds of the disease is a process requiring a considerable length of time, but it can be done. He does not think that universal pasteurization is wise or necessary, but it is essential to the greater part of the milk supply of large cities. It is not feasible in small communities or on farms where, it is admitted, most of the cases occur.

There is much that is still obscure regarding the infection of the udder with abortion bacilli—the actual location of the infection, the intermittent appearance of bacilli in the milk, the relationship between the presence of agglutinins in the milk and the presence of bacilli in the udder, the relationship between the presence of agglutinins in the milk and in the blood. With a view to clearing up some of these points work has been begun in connexion with the correlation between the agglutination titre of the milk, and the presence of bacilli in it; the work is not complete but certain facts have been revealed.

The milk was examined from all four quarters of 34 animals, 9 of which were tested twice, giving a total of 43 animals. It was tested by agglutination and by guineapig inoculation. The bacillus was not recovered from milk showing agglutinins under 1 in 80, nor from the milk of an animal with a serum titre below 1 in 320. It was recovered from 53·7 per cent. of the milk from quarters showing agglutinins in dilutions of 1 in 80 or higher. It is therefore concluded tentatively, that whey which will cause agglutination in dilutions of 1 in 80 or higher comes from quarters probably infected actively with the bacillus, while quarters, the milk of which causes agglutination in dilutions under 1 in 80, rarely contain or eliminate the organism. The author holds that the presence of agglutinins in the milk is mainly or exclusively an evidence of local production of agglutinins. It has frequently been shown that there is no constant relationship between the agglutinins of the milk and those of the blood.

BOYD (W. L.), DELEZ (A. L.) & FITCH (C. P.). **The Association of *Bacterium abortus* Bang with Hygroma of the Knee of Cattle.**—*Cornell. Vet.* 1930. July. Vol. 20. No. 3. pp. 263–269. With 2 figs.

The authors describe two cases of hygroma of the knee in cattle from which they recovered by culture and by guineapig inoculation Bang's bacillus.

GILBERT (S. J.). **An Unusual Strain of Brucella causing Abortion of Cattle in Palestine.**—*Jl. Comp. Path. & Therap.* 1930. June. Vol. 43. No. 2. pp. 118–124.

The author describes cases of abortion which failed to give positive agglutination tests or gave only very weak reactions when the routine strain (Lister E.624) was used.

Subsequently, an abortion bacillus was isolated from a foetus and retests with the sera against this strain greatly reduced the number of negative reactions .

In cultures lenticular and round colonies could be differentiated and better emulsions appeared to be obtained from the lenticular type.

The author gives details of parallel tests with this strain, and with Lister E.624, and a strain of *Br. melitensis* also obtained from the Lister Institute. The tests included growth on potato, lead acetate tests, pathogenicity, tests of native cattle and goats, tests of cattle actually aborting, interagglutination and absorption tests.

From these it appears that there is a strain of *Br. abortus* in Palestine which is of low virulence for the lower animals. It is capable of causing abortion, but has given rise to no typical outbreaks. Native cattle appear to acquire little or no immunity as a result of infection with the local strain. The available evidence appears to suggest that sheep and goats may be carriers.

MALLARDO (C. A.). **The Identity of** *Bacillus abortus* **with** *Bacillus melitensis.*—*Jl. Trop. Med. & Hyg.* 1930. May 1. Vol. 33. No. 9. pp. 125–126.

The author finds that *Br. melitensis*, *Br. paramelitensis* and *Br abortus* have the same action on sugar media, whether grown alone or in symbiosis with other organisms, and he considers that these results possibly indicate identity of the three.

GAMBIER (A.). Un cas de mélioïdose observé à Phnôm-Penh. [**A Case of Melioidosis at Phnôm-Penh.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 436–441.

The case recorded occurred in a man of Russian nationality living in Bangkok. The patient, who had arrived from Saigon the day before and was then suffering from delusions, was taken to hospital on May 9th, 1928, in such a state of excitement that he was thought to be demented. Mental confusion was a marked symptom, for in reply to questions he intermixed two or three languages in his replies. There was a considerable degree of fever, but little or nothing else in the way of symptoms. Death took place on the 3rd day. From materials collected at the post-mortem examination, was isolated a cocco-bacillus both directly and through guineapigs. This organism in artificial cultures quickly changed into a slender bacillus, but the cocco-bacillary form was promptly restored by animal inoculation. The author describes the cultural and other characters of the gram negative organism and states that he compared it with cultures of *B. whitmori* obtained from the Pasteur Institute at Saigon and concluded that the organisms were identical.

LETONTURIER, MARTIN & SOUCHARD. Un nouveau cas de mélioïdose observé en Cochinchine. [**A New Case of Melioidosis in Cochin-China.**]—*Bull. Soc. Path. Exot.* 1930. Mar. 12. Vol. 23. No. 3. pp. 273–279. With 1 text fig.

The authors describe a case in an Army Officer in Cochin China. The disease could readily have been mistaken for typhoid on clinical

grounds, and an exact diagnosis was only possible by laboratory investigations.

Increase in the polynuclears in the blood which was observed before there was any recognizable suppuration excluded a diagnosis of typhoid, which is always associated with an increase in the mononuclears. Haemoculture and agglutination tests made the diagnosis definite.

MUTERMILCH (S.) & SALAMON (E.). Sur la vaccination du lapin et du cobaye contre le tétanos cérébral. [**Vaccination of Rabbits and Guineapigs against Cerebral Tetanus.**]—*Ann. Inst. Pasteur.* 1930. July. Vol. 45. No. 1. pp. 85–101.

The author finds that while the subcutaneous or intraperitoneal injection of anatoxin leads to the production of antitoxin in the general circulation, there is no antitoxin to be detected in the cerebro-spinal fluid of such animals.

If, however, the anatoxin be injected subdurally, antitoxin is formed, not only in the general circulation, but in the cerebro-spinal fluid also.

There is a difference in the behaviour of rabbits and guineapigs which have been immunized either actively or passively by the subcutaneous or the intraperitoneal paths. Whereas guineapigs so protected in a considerable proportion of cases resist intracerebral injection of tetanus toxin, rabbits in most instances are not effectively protected.

Intracranial immunization invariably establishes protection against the injection of the toxin into the brain. The presence of antitoxin in the cerebro-spinal fluid is essential to the protection of animals against the injection of tetanus toxin into the central nervous system.

ALLEN (H.). **Strangles in a Country-bred Remount Depot in India.**—*Jl. Comp. Path. & Therap.* 1930. June. Vol. 43. No. 2. pp. 142–146.

The author describes the plan adopted for dealing with large numbers of recently purchased young horses over a period covering some ten years. From the results it would appear that "pyovaccination" coupled with "paddock dispersion" as was practised during the year 1926–27 produced the best results.

The pyovaccine was prepared as follows: 4 cc. of freshly obtained pus was mixed with 10 cc. of sulphuric ether and shaken with beads. This was left for 12 hours with frequent shaking. Five cc. of sterile normal saline were added. This was used as vaccine. Dose is not stated.

BALDREY (F. S. H.). **Tuberculosis in an Elephant.**—*Jl. Roy. Army Vet. Corps.* 1930. Aug. Vol. 1. No. 4. p. 252.

An elephant recently landed at Port Said had shown signs of illness for about ten days, and had developed a large swelling in the region of the throat. Death occurred, and prior to making a post-mortem examination the author observed pus coming from the mouth. On exposing the throat it was found that there was extensive abscess-formation and ulceration. The lungs were found to be "filled completely with caseous tubercular lesions. The mediastinal glands, spleen, and some of the mesenteric glands were also affected."

Tubercle bacilli were sparingly present in the pus from the pharynx.

KRANEVELD (F. C.). Bijdrage tot de kennis van de osteomyelitis bacillosa bubalorum. [**Contribution to the Study of Bacillary Osteomyelitis of the Buffalo.**]— *Veeartsenijkundige Med. No. 71. Departement van Landbouw. Nijverheid en Handel. Veeartsenijkundig Institut.* 1930. Utrecht : Schotanus & Jens.

A condition which has been described as Bacillary Osteomyelitis of buffaloes by DE DOES occurs in the Dutch East Indies, but is apparently not recognized elsewhere. The causal organism is a bacillus, which has been recovered in a state of purity from all cases that have been examined. This bacillus is morphologically and culturally not distinguishable from the organism described by ZEISSLER and ROSSFELD as Bacillus gigas.

It appears to be probable that there is some predisposing cause which reduces the power of resistance of the bones and bone marrow. There is no recognizable difference in the chemical composition of the bones of animals affected with the disease.

Under certain circumstances the disease may occur widely in certain areas. It is clinically recognizable by disturbance of locomotion and muscular atrophy; abscesses make their appearance between the muscles and in the subcutaneous tissue, and bone marrow fistulae occur.

The disease begins with acute lameness in the limbs, but usually passes on into a chronic condition.

The lesions found are necrosis of bone marrow with abundant pus formation as a secondary condition. The pus escapes from the marrow cavities near the epiphyses of the bones and thus gives rise to the intermuscular and subcutaneous abscesses. The thick hide of the buffalo may prevent actual abscess formation and marrow fistula becomes established. Sequestra and fractures are sequels which are of frequent occurrence.

BORDET (P.). Influence de calcium sur les caractères des espèces microbiennes. [**The Influence of Calcium on Species of Microbes.**]— *Ann. Inst. Pasteur.* 1930. July. Vol. 45. No. 1. pp. 26–41. With 19 coloured figs. on two double plates.

Certain properties possessed by bacteria are profoundly altered by deprivation of calcium. It exaggerates with considerable regularity their power of sporulation. A species comprising two races which are of unequal sporulating power, under the influence of an oxalated (calcium deprivation) medium tends to develop a marked predominance of the sporulating variety. Calcium therefore appears to be a factor in variation.

It is probably a disturbance of this variability which explains the important increase in the chromogenic powers of Micrococcus prodigiosus observed in the absence of calcium.

Deprivation of calcium also seems to have an influence upon morphology in some species, as it transforms them into short coccobacillary forms.

This deprivation of calcium does not reduce the vitality of the organism nor does it alter its hereditary characteristics. When calcium is restored normal growth occurs.

DISEASES DUE TO FILTERABLE VIRUSES.

REMLINGER (P.) & BAILLY (J.). L'évolution du parasite de la rage comporte-t-elle un cycle? [**Has the Parasite of Rabies a Cycle of Development?**]—*Ann. Inst. Pasteur.* 1929. Nov. Vol. 43. No. 11. pp. 1396–1407.

The authors point out that in the case of bacteria injection into susceptible animals leads to prompt multiplication and extension, and into insusceptible to prompt removal and disappearance. Exactly the reverse happens when the virus of rabies is injected. The virus cannot be recovered from the brain of a dog soon after inoculation until symptoms develop. It then reappears. Insusceptible animals retain the virus locally for a period of a week or more.

The authors argue that the explanation which most closely fits these facts is that in a susceptible animal a cycle of development takes place, and that during the period when it cannot be recovered from the seat of inoculation it is at a developmental stage which is not detectable by inoculation or even not inoculable. In the insusceptible animal no cycle of development occurs and the virus remains locally where it is planted.

SICÉ (A.) & BOISSEAU (R.). Contribution à l'étude de la rage canine (virus des rues) en Afrique Equatoriale Française. [**Canine Rabies (Street Virus) in Equatorial French Africa.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 703–709.

The first record of canine rabies (street virus) in Equatorial French Africa appears to have been made by BLANCHARD and LEFROU. These authors recorded experimental inoculations of rabbits and guineapigs with brain material from two dogs. A small number of passage inoculations were carried out and it was found that the virus proved fatal to rabbits in 15 to 21 days and to guineapigs in 21–26 days. Lack of animals prevented a longer series of inoculations from being carried out.

Having the opportunity to study two dogs suspected of rabies the authors have repeated the experiments of BLANCHARD and LEFROU.

A rabbit inoculated directly with a fragment of brain tissue from one of the dogs developed symptoms on the 17th day and died on the 23rd day. A piece of brain was placed in glycerin at once, and ten days later this was used for the inoculation of a further rabbit. The result was quite negative.

A second native dog which had shown only symptoms of irritability died rather suddenly. A rabbit inoculated intramuscularly died suddenly on the 17th day, having shown no evidence of paralysis. Inoculation of another rabbit (Rabbit B) from this one resulted in the development of paralysis, and death occurred on the 14th day. A piece of brain tissue from the Rabbit B preserved in glycerin for 10 days failed to produce any symptoms on inoculation into another.

Brain tissue from Rabbit B was desiccated by potassium hydrate, and a series of daily inoculations was carried out. A rabbit developed suspicious symptoms and died after inoculation with virus which had been dried for 6 days. Immersion of desiccated virus in glycerin for ten days did not appear to affect the virulence further.

This series of experiments is small and the results were rather inconsistent.

It was not found possible to " fix " the virus, and it has not as yet been possible to trace the source of infection in these dogs.

STEEVENSON (G. F.). **A Note on the Occurrence of Pyrexia as a Premonitory Symptom of Rabies in Horses.**—*Jl. Roy. Army Vet. Corps.* 1930. Aug. Vol. 1. No. 4. pp. 250–251.

The writer gives details of five cases of rabies in horses which occurred at Sialkot during 1927 and 1928.

It is not mentioned in most text-books and does not appear to be generally known that apparently simple fever may be a premonitory symptom of rabies in horses and probably also in mules and donkeys. Any animal admitted to hospital in places where and at times when rabies is prevalent should be looked upon with suspicion and precautions taken for the safety of personnel and other animals.

Brief details of the cases are as follows :

I. 25.11.27. Admitted to hospital with fever.
26.11.27. Temperature normal, apparently recovered.
27.11.27. Apparently normal in morning, but definite symptoms of rabies by the evening. Animal destroyed. No history of having been bitten. Negri bodies found.

II. Rabies prevalent in district, and rabid dog had entered stables, 11.1.28.
29.1.28. Horse admitted with " colic," temperature 101·4.
30.1.28. Definite symptoms of rabies. Animal destroyed.

III. 30.1.28. Temperature 104. Some apparent improvement in general condition during the next two days, but temperature still above 104.
2.2.28. Symptoms of rabies developed rapidly. Paralysis complete in 30 hours.
Known to have been bitten by the dog referred to in Case II. Bite was on the lip.

IV. No history of bite available.
13.2.28. Admitted to hospital with temperature 104. Animal uneasy. Salivation observed almost immediately after admission.
14.2.28. Horse completely paralysed about 4 a.m. and dead in 4 hours. Negri bodies found.

V. No history of bite.
21.6.28. Temperature 104. Horse not feeding.
22 and 23.6.28. Slight improvement in general condition, but temperature steadily mounting to 107, with some uneasiness.
24.6.28. Definite symptoms of rabies. Horse destroyed.
Examination of brain failed to reveal Negri bodies.

ITABASHI (K.). **Studies on the Intraplantar Inoculation of Rabic Virus. I. Experiments with Virus fixe.**—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 238–251. [In Japanese. English summary.]

The author finds that guineapigs can be infected with fixed virus by intraplantar inoculation, and that the disease runs its ordinary course,

the virus at death being recoverable from the nervous system. There was no recognizable change in the properties of the virus after 5 passages.

In some cases intraplantar inoculation failed to infect, and these animals resisted subsequent inoculations by the same route. The author suggests that a local immunity may have been developed.

Of nine guineapigs which had been inoculated into the pad three times without infection resulting, only one was found susceptible subsequently to subdural inoculation. Where infection resulted from subdural inoculation in guineapigs repeatedly injected into the pads, the interval elapsing between inoculation and death was prolonged. From the few cases observed it appeared that the immunity resulting from repeated intraplantar inoculations lasted for about 6 months. The serum of immune guineapigs possessed virucidal properties.

Guineapigs can be infected with street virus by intraplantar inoculation.

The author was unable to detect the presence of virus in the brain of a guineapig which died following a subdural inoculation of fixed virus thirteen days after three intraplantar inoculations. He suggests that it was a case of autosterilizable neuro-infection (Levaditi).

KONDO (S.) & OBANA (K.). **Studies of the Complement Fixation Reaction in Rabies.**—*Jl. Japan. Soc. Vet. Sci.* 1929. Dec. Vol. 8. No. 4. pp. 252–257.

The author was not able to detect any antibody capable of causing complement fixation.

REMLINGER (P.) & BAILLY (J.). La vaccination antirabique des animaux et du chien en particulier au Maroc en 1929. [**The Anti-Rabic Vaccination of Animals, and particularly of Dogs in Morocco in 1929.**]—*Rev. Gen. Méd. Vét.* 1930. May 15. Vol. 39. No. 461. pp. 257–263.

Morocco is ahead of Paris as regards the protective inoculation of dogs against rabies. Vaccination is carried out in Morocco by practitioners with the same facility as vaccination against anthrax or swine erysipelas. Dogs which have been vaccinated less than a year which are bitten by rabid or suspected dogs are not killed, but after revaccination are kept under observation for six months.

The number of dogs vaccinated during 1929 (635) exceeded the number done during the previous year by 371. The vaccine used was the virus-ether vaccine of the Pasteur Institute of Tangier. A table gives the number of dogs vaccinated in different districts, dividing these up into : (*a*) those vaccinated prophylactically ; (*b*) those vaccinated after having been bitten, and those which received a renewal inoculation.

The animals have been under observation for periods ranging from 3 to 15 months, and no case of rabies has developed. No case has been observed among animals vaccinated during 1928. With one exception, no case of paralysis has been encountered.

Of animals other than dogs, 10 horses, 5 mules, 4 bovines, and 4 pigs have been vaccinated, all of them after having been bitten. There were no accidents of any kind, and no animal developed rabies.

A brief account is given of an outbreak of equine rabies in November and December, 1928. On November 29th, 1928, a mule became affected with furious rabies, and bit three others. These were vaccinated, and

none contracted the disease. On December 26th, a horse belonging to the same military unit became rabid and bit two other horses, and two mules. These were also vaccinated with ether-virus. On December 31st a horse developed furious rabies (Negri bodies were subsequently found in the brain) and bit five other animals. These were vaccinated, and all escaped infection.

VERGE (J.) & VAN HUYEN (P.). Recherches sur la vaccination anti-rabique du chien. [**Research regarding Anti-Rabic Vaccination of the Dog.**]—*Rec. Méd. Vét.* 1930. May. Vol. 106. No. 5. pp. 249–268.

In the opening part of their paper the authors give a list of the methods which have been tried for the protective inoculation of dogs against rabies. These are divided into two main groups: A. General vaccination; and B. Local vaccination, and again subdivided according as the unaltered virus or virus modified in a variety of ways is used.

Verge and van Huyen have carried out a number of tests with a formol-glycerine vaccine prepared upon the lines suggested by PUNTONI, SCHOENING and PLANTUREUX. This was made as follows: The brain of a rabbit killed with fixed virus was reduced to a fine pulp, and then subjected to long grinding in a mixture of glycerine and normal saline containing 4 per thousand formalin. One part of brain was used to 4 parts of this mixture. The mixture was strained through gauze, and then incubated at 37° C. for 24 hours. Of thirteen dogs vaccinated with this material three suffered from a temporary post-vaccinal paralysis.

The authors pass under review the methods of vaccinating given in their list, and from the results published they draw certain general conclusions.

They find that post-vaccinal paralysis frequently occurs in dogs. As yet no explanation of this is forthcoming, and they hold that further investigation is desirable. In a small proportion of cases temporary intoxication is produced by the injection of nerve tissue. Sudden death may follow the injection of a series of doses. This has been observed in the sheep and rabbit, and may possibly occur in other species. The development of local lesions such as abscesses, swellings, etc., occurs infrequently.

The dangers of anti-rabic inoculation may be referable to the following factors: Rabies due to fixed virus following the injection of unmodified or insufficiently attenuated virus, the presence of virus in the brains of animals immunized, and the elimination of virus in the saliva of vaccinated animals. There is a difference of opinion among investigators as to whether this elimination by the saliva actually occurs.

The obstacles in the way of anti-rabic vaccination of animals are: The techniques of the methods, the relatively short duration of the immunity, the variability of the virus, and sanitary legislation.

The authors consider, however, in spite of the dangers and difficulties that from the veterinary point of view, the problem of the active immunization against rabies is practically solved, and the vaccination of dogs can render great service in the eradication of the disease.

They consider that it would be wise to permit in certain cases the vaccination of dogs without making any precipitate change in the existing laws.

PIRANI (A.). Sulla peste equina in Eritrea. [**Horse Sickness in Eritrea.**]—*Nuova Vet.* 1930. Mar. 15. Vol. 8. No. 3. pp. 69–82. With 4 figs., 2 charts & 1 map.

A very large part of this paper is taken up with an account of the work of earlier investigators and of THEILER's work in South Africa. The author thinks that it is not a practicable proposition to use protective serum in Eritrea for various reasons. He has carried out experiments with a view to the preparation of a vaccine.

Blood has been collected from a number of horses affected with horse sickness from different areas. This was preserved with Edington's liquid and kept in a refrigerator. It was used for infecting experimental animals. When these died some of the blood was mixed with Edington's fluid after defibrination and the rest mixed with 2 per cent. formalin in the proportion of 1 to 10.

Tabular statements show details of two mules which were given one and two doses of 10 cc. of formolized blood respectively and subsequently a dose of virus. Both appear to have survived without showing any febrile attack.

JUDGE (J.). **Notes on African Horse Sickness in Mules in the Anglo-Egyptian Sudan.**—*Jl. Roy. Army Vet. Corps.* 1930. May. Vol. 1. No. 3. pp. 179–180.

The local name for the disease is Nigma (a star) and it is connected with a belief that the disease is contracted by animals drinking when stars are reflected in the water. There is perhaps a rational connection since it is possible that the transmitting agent is a nocturnal insect.

The author has observed the disease among mules at El Obeid in Kordofan Province.

The land to the north, east, and west is desert, but there is vegetation to the south.

Rains begin about the middle of July and continue till the end of October. Evidence of the disease appears among the mules in September and continues till the end of November.

It has been observed that many cases occur among mules going to a place some 20 miles north of El Obeid, where there is no vegetation, and only one well. In spite of this, however, the evidence all points to this place as being the source of the infection.

The symptoms and post-mortem lesions are those of horse sickness. Recovery may take place, but recovered animals are useless for service. They are poor in condition and remain so in spite of good feeding, and are always likely to lag on the march.

In years when horse sickness is rife there are not necessarily many mosquitoes to be seen or heard, and it is suggested that some other transmitting agent may be responsible.

BOUHANNA. Quelques cas d'encéphalo-myélite contagieuse du cheval dans le Sud-Constantinois. [**Cases of Contagious Encephalomyelitis of Horses in South Constantine.**]—*Rev. Vét. et Jl. Méd. Vét.* 1930. Aug. Vol. 82. pp. 425–434.

During the summers of 1928 and 1929 there appeared among the horses belonging to the military authorities and to civilians at Biskra

and Touggourt a contagious disease which had not previously been recognized there.

Essentially the condition was characterized by progressive paralysis, slight fever, anaemia, and, in some cases, epileptiform seizures. A brief account is given of a succession of cases or groups of cases among the horses belonging to a particular regiment, and reference is made to a small number of cases among horses in private ownership.

The available evidence indicated that the disease did not spread by direct contact. During the hot weather, when the cases first occurred, no bedding is used on hygienic grounds. The heat would cause rapid fermentation and this would favour the multiplication of flies. With the onset of cold weather the cases ceased to occur. Age and condition of the animals appeared to play no part in susceptibility to the disease, or to influence the severity of the attacks.

A severe and a benign form of the disease are described ; in the later case slow recovery takes place, but in the former the mortality is about 60 per cent.

Bacteriological examinations and experimental inoculations failed to throw any light upon the cause of the condition.

Atoxyl appeared to have no specific action, but very favourable results were obtained with urotropine. 8 to 10 grms. were given intravenously in 50 cc. of water, or subcutaneously in 100 cc. In the absence of urotropine formalin may be used with practically the same results. 5 cc. in 150 cc. of normal saline may be injected intravenously with the requisite precautions.

NICOLAU (S.) & GALLOWAY (I. A.). L'encéphalo-myélite enzootique expérimentale (maladie de Borna). Deuxième mémoire. [**Experimental Borna Disease.**]—*Ann. Inst. Pasteur.* 1930. June. Vol. 44. No. 6. pp. 673–696. With 1 text fig.

The authors find that in a dried state the virus can retain its pathogenic properties at laboratory temperature for more than 300 days. At room temperature in cow's milk it remains virulent for at least 100 days. Tap water contaminated with the virus remains virulent for at least 30 days.

In salt solution at pH 7·6 the virus does not survive a fortnight either at room temperature or at body temperature.

Alkalinity in a liquid medium is injurious to the virus, while neutrality or slight acidity favour its persistence. Marked acidity (pH 5 to pH 4·8) destroys its virulence rather rapidly.

The virus is capable of becoming diffused throughout a liquid medium in which a piece of infective nervous tissue is placed.

Pathogenic properties of a virulent emulsion cannot be demonstrated in dilutions beyond 1 in 20,000.

Contrary to what is the case with many of the other ultra-viruses, that of enzootic encephalo-myelitis is adsorbed by inert powders in a very incomplete and irregular manner.

Liver extract which *in vitro* neutralizes certain toxins has no action upon the virulence of the virus of Borna disease. Permanganate of potash has a very feeble antiseptic action upon the virus.

Stovarsol in repeated doses to infected rabbits affords no protection.

PICARD (W. K.). Pseudo-Vogelpest (II). [**Pseudo-Fowl Plague. II.**]—*Veeartsenijkundige Med. No. 72. Departement van Landbouw, Nijverheid en Handel.* 41 pp. 1930. Archipel Drukkerij-Buitenzorg.

This Bulletin contains a review of experiments carried out at the Veterinary State Institute, Java, for the control of Pseudo-Fowl Plague.

Potassium permanganate, "Zonite," neosalvarsan, and urotropine were all found to be useless for the treatment of the disease.

Vaccines were prepared in a variety of ways based upon well-known methods. These were Mieszner-Baars (dry chalk vaccine), Umeno-Doi (glycerin carbol saline), Kelser (chloroform vaccine—rinderpest), and passage through pigeon, but while definite conclusions are not as yet justified, it appears to be unlikely that any of these methods will furnish useful results. An attempt to produce an antiserum from turkeys and geese for the purpose of carrying out a serum simultaneous inoculation has produced results which afford useful indications as to the lines for future research.

MYCOSIS.

BROCQ-ROUSSEU. Sur le développement du cryptocoque de la lymphangite épizootique. [**The Development of the Cryptococcus of Epizootic Lymphangitis.**]—*Bull. Acad. Vét. France.* 1930. Mar. Vol. 3. pp. 150–153.

The author discusses the classification of the parasite in the light of the available information regarding its development in lesions and in artificial cultures. He states that it is not desirable to stain specimens for examination because it may lead to errors. After having examined very large numbers of specimens in the course of several years he states emphatically that he has never seen the cryptococcus multiplying by a process of budding. He believes that the appearance which suggests budding is actually due to two parasites of unequal size lying side by side.

If one examines in the fresh state pus collected from the central area of an infected lymphatic it will be found to be crowded with rounded elements, of all sizes, and these elements show all grades of variation in the thickness of their capsules. If a fully developed cryptococcus be examined very carefully it will be found that there is a small gap in the envelope at one of the poles, and no doubt this represents a round or oval aperture. Brocq-Rousseu thinks that VELU, who described the passage of motile particles through a rupture in the envelope of the parasite, saw a corpuscle make its exit from a cryptococcus through this aperture. Ordinary microscopes are not completely satisfactory for the study of fine cytological details, and the cryptococcus should be examined with more delicate instruments. If budding be not the method of reproduction there must be some other form. Two suggestions are advanced. Either cryptococcus behaves like *Plasmopara viticola* and sends out mobile zoospores which lose their motility and become encapsuled, or it behaves like a cyst and emits spores as in the case of *Mycoderma immitis*—the cause of American cutaneous blastomycosis.

MISCELLANEOUS.

DICKINSON (C. G.). **Waratah Horse Disease.**—*Australian Vet. Jl.* 1930. June. Vol. 6. No. 2. pp. 65–67.

Cases occur in animals of any age or of either sex, and they are most frequently seen between Christmas and Easter. The illness lasts four to six days and the disease is invariably fatal. Irritability and a tendency to bite other horses is the first evidence of illness. Congestion of the mucous membranes, inco-ordination of movement, constipation, faeces pale and mucus-covered, pushing against the wall or manger with the head, great thirst, and apparently in some cases haemoglobinuria are the symptoms encountered.

In two animals examined post-mortem the lesions were as follows: congestion of the lungs, petechiae on the pericardium, liver pale and markedly cirrhotic, patchy inflammation of the bowels, oedema of the caecum, a fairly abundant peritoneal exudate, and congestion of the kidneys.

The results of two feeding experiments with Senecio australis, which is known locally as " fireweed " gave inconclusive results.

GARUDACHAR (M. K.). **A Note on the Toxicity of an Aqueous Extract of Bamboo Shoots (Gramineae—Bambusa arundinacea).**—*Vet. Jl.* 1930. Jan. Vol. 86. No. 1. pp. 31–34.

The author records a few experiments, which were apparently carried out in 1916, to shew that young bamboo shoots finely chopped and soaked in water for 3 or 4 days yield an extract which contains hydrocyanic acid in amount sufficient to cause fatal poisoning. One sheep died in less than 1½ hours after the administration of 300 cc. of the extract, and a goat four months old died 15 minutes after it had been given the same dose.

REVIEWS AND NOTICES.

BAKKER (Stefanus). **Over de surra en hare bestrijding in Nederlandsch-Indië.** [Surra and its Control in the Dutch Indies.] [Thesis for Doctorate in Vet. Science, Univ. Utrecht.]—180 pp. 1930. Utrecht: Drukkerij Fa. Schotanus & Jens.

This is a thesis of 172 pages, divided into six chapters and including a bibliography with 172 references.

In an introduction, the author gives a general account of the importance, distribution and symptoms of the disease, and discusses briefly the history of its occurrence and recognition in the Dutch East Indies. He emphasizes the chronic or occult character of the infection which may be seen in cattle,

and still more in buffaloes, that are well fed and cared-for, and the important part which such animals may play as unsuspected " carriers." The official reports for the years 1920–1927 record the occurrence of 4,348 cases in cattle, 6,819 cases in horses, and 15,047 in buffaloes, but many cases are never reported, and the figures are certainly incomplete. To the economic loss from actual deaths (100 per cent. in horses until recent years) one must add that incurred directly and indirectly in connection with preventive measures, such as compulsory isolation. No cases have yet been recorded from the islands of Bali, Soemba, Flores or New Guinea, nor from the Moluccas.

In the first chapter the author describes his personal experience during a period of 2 years in a district in N.W. Sumatra. He gives an interesting account of the incidence of the disease in relation to the different types of country and the various species of animals and the conditions under which they were kept (mainly " ranching " conditions). The disease occurred throughout the year, but especially in July and August, and appeared particularly in well-wooded areas. The second chapter gives his experience under very different conditions in a thickly populated and highly cultivated district of East Java, where there was practically no ranching, horses were generally stabled, and food conditions were often very unfavourable. Here Tabanidae were not nearly as numerous as in the Sumatra district referred to, and as a rule only sporadic cases of surra were seen. The disease sometimes occurred as an epizootic amongst the working animals of the sugar factories, which were more exposed and more crowded than the ordinary native-owned stock.

In the third chapter the author gives a general review of the literature on the chemotherapeutic treatment of surra and other trypanosomiases, and records his own results in the treatment of naturally occurring cases. He concludes that in cattle and buffaloes treatment with naganol at an early stage is practically always successful, but that advanced cases should not be treated. Both species tolerate the drug very well ; buffaloes may be given 5 gms. without danger, and adult Java cattle from 3 to 5 gms. From observations on a series of 12 horses, with 6 apparent recoveries, he concludes that treatment is successful only if started at an early stage, and that it is best to combine naganol with atoxyl or emetic. A native horse of 175 kg. or more may be given a dose of 4 gms. ; this may induce symptoms of intoxication but they are generally transitory and not serious. Such a horse will tolerate 4 or 5 gms. of atoxyl, and 1 gm. of tartar emetic (as long as the blood does not show parasites on microscopic examination).

In the fourth chapter the author reviews the literature on prophylaxis, and records his own experience with naganol. During outbreaks he gave prophylactic injections of 3 gms. to the stall-mates of cases, and other horses were given 1 gm. per 100 k.g., the injection being repeated after one month. Excellent results were obtained in horses, cattle and buffaloes, although the disease could not be actually eradicated in this way, and Bakker claims that this procedure may effectively and most economically replace the older isolation method.

The fifth chapter records the author's attempts to obtain naganol-fast strains of the trypanosome in rats and mice. A limited amount of success was obtained, especially by prolonged exposure to subtherapeutic doses of the drug in a series of animals, but the parasites resisted only minimal curative doses, and were always destroyed by higher concentrations. Moreover, exposure to naganol in this way seemed to render the trypanosome less virulent.

The last chapter deals with diagnosis, and for the discovery of " carriers " Bakker recommends especially the intraperitoneal inoculation of large amounts of blood into dogs. He obtained satisfactory results with the formol-gel test, but did not find the sublimate reaction of BENNETT and

KENNY sufficiently accurate in cattle and dogs. In his hands complement-fixation seemed to be useful and accurate, and a watery extract of trypanosomes proved superior, as antigen, to an alcoholic extract of the heart of a dog suffering from the disease.

W. H. Andrews.

DISCONTINUANCE OF THE TROPICAL VETERINARY BULLETIN.

The Imperial Bureau of Animal Health, which was officially opened on the 1st October, 1929, having announced the intention to publish an abstracting journal early in 1931, it has been decided to discontinue the *Tropical Veterinary Bulletin* with the present volume. Subscribers wishing for information about the new publication should address enquiries to the Imperial Bureau of Animal Health, Veterinary Laboratory, Ministry of Agriculture and Fisheries, New Haw, Weybridge, Surrey, England.

An Index to this concluding volume will be issued early in 1931.

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Compiled by MISS M. H. JAMES.

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